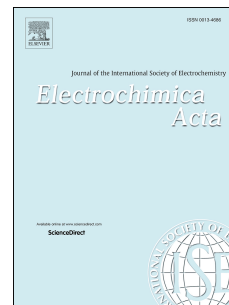


Accepted Manuscript

Capacitor behavior in neutral electrolytes of ordered mesoporous manganese oxide obtained from oxidation of perfluorinated alkenes by soft template CTAMnO₄

C.C.H. Tran, C. Damas, J. Santos-Peña



PII: S0013-4686(18)30713-8

DOI: [10.1016/j.electacta.2018.03.187](https://doi.org/10.1016/j.electacta.2018.03.187)

Reference: EA 31553

To appear in: *Electrochimica Acta*

Received Date: 1 August 2017

Revised Date: 21 February 2018

Accepted Date: 29 March 2018

Please cite this article as: C.C.H. Tran, C. Damas, J. Santos-Peña, Capacitor behavior in neutral electrolytes of ordered mesoporous manganese oxide obtained from oxidation of perfluorinated alkenes by soft template CTAMnO₄, *Electrochimica Acta* (2018), doi: 10.1016/j.electacta.2018.03.187.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Capacitor Behavior in Neutral Electrolytes of Ordered Mesoporous Manganese Oxide Obtained from Oxidation of Perfluorinated Alkenes by Soft Template CTAMnO₄

C.C.H. Tran^a, C. Damas^{a,b}, J. Santos-Peña^{a,b,*}

^a Laboratoire de Physico-Chimie des Matériaux et des Electrolytes pour l'Energie, PCM2E (EA 6299), Université de Tours François Rabelais, F-37200 Tours, France

^b Laboratoire de Recherche Correspondant CEA Le Ripault-PCM2E, Monts, France

*Corresponding author: jesus.santos-pena@univ-tours.fr

Abstract

Ordered mesoporous manganese oxides were produced as a by-product of the oxidation of perfluorinated alkenes by soft template CTAMnO₄ (CTA= cetyltrimethylammonium). Pores diameter was in the 2.4-6.0 nm range and pore walls were made of birnessite nanocrystallites. Alkene dimensions influenced the oxides morphological and textural properties, including pore ordering. For a particular alkene (1H, 1H, 2H Perfluoro-1-Decene), the surface specific area (SSA) of the manganese oxide was as high as 265 m².g⁻¹. Mesoporosity, combined with large SSA, guarantee rapid diffusion and access of the electrolyte to the electrochemical capacitor electrode surfaces. Composites of mesoporous oxides, black carbon and Teflon in a 75/12.5/12.5 weight ratio provided capacitances in the 150-175 F.g⁻¹ range in neutral aqueous 1M K₂SO₄ electrolyte. Asymmetric AC||MnO₂ devices, cycled reversibly in a 0-1.7 V voltage window, had a pore-depending activation time during which capacitance increases upon cycling. Ragone plot for these MnO₂-based electrodes shows suitable gravimetric energy retention with increasing power, comparable or higher than most of the literature results concerning composite electrodes (except for microsupercapacitors). For instance, energy provided by such devices, at power close to 0.2 kW.kg⁻¹, approaches 20 Wh.kg⁻¹. From this point of view, our devices can compete with others containing a very high amount of low density and expensive conductive additive in the positive electrode formulation, which penalizes the volume and cost of the final device.

Keyword: electrochemical capacitors, manganese oxide, ordered mesoporous materials, asymmetric devices, Ragone plot.

1. Introduction

Download English Version:

<https://daneshyari.com/en/article/6603144>

Download Persian Version:

<https://daneshyari.com/article/6603144>

[Daneshyari.com](https://daneshyari.com)